Estimate: Raising or Reconstruction of Bridges to Improve Flow of Flood Waters in Passaic Valley (1971)

Volume 1 of 2

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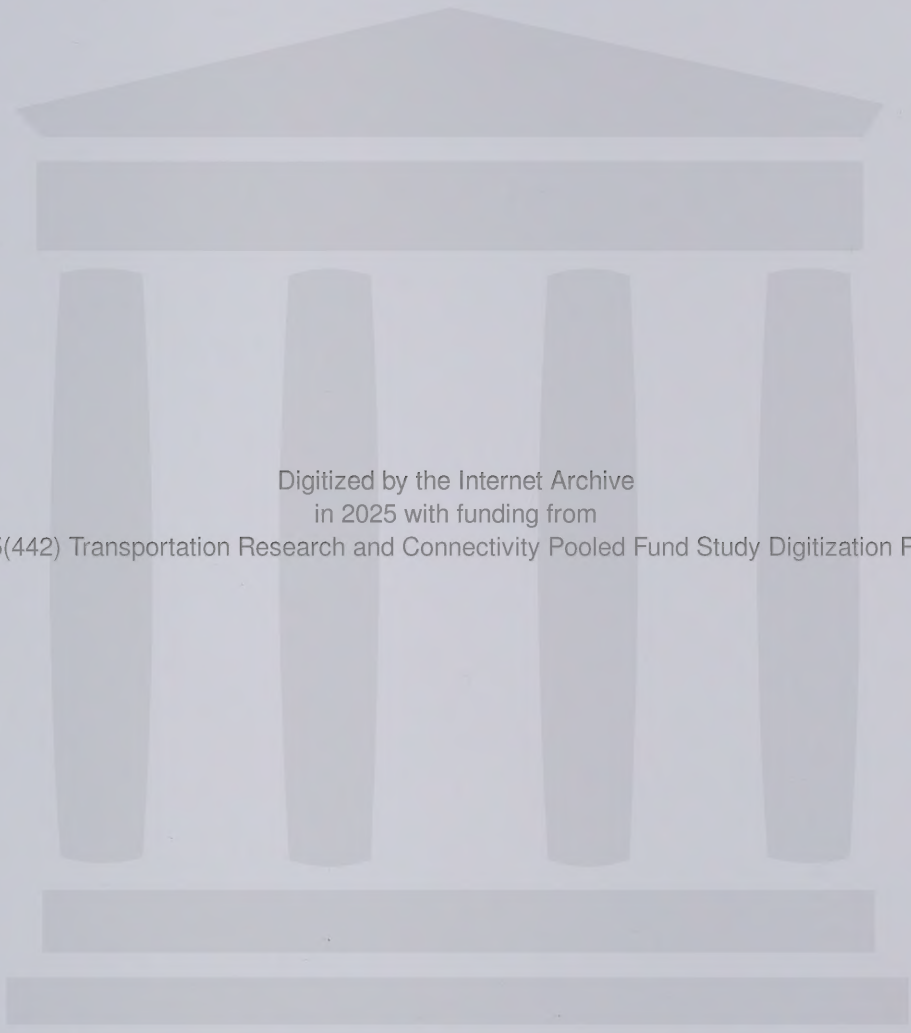

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IN REPLY PLEASE REFER TO

State of New Jersey

DEPARTMENT OF TRANSPORTATION

JOHN C. KOHL, COMMISSIONER

TRENTON 08625

February 23, 1971

Mr. Ira Grayson
Administrative Assistant
to the Governor
Office of the Governor
Trenton, New Jersey

Dear Mr. Grayson:

Pursuant to your request and in accordance with instructions to the Department of Transportation, an estimate has been made by our staff to remove or reconstruct numerous bridges on the Passaic River or "major damage tributaries thereto", to improve the flow of flood waters in the Passaic Valley. The basic guideline for this endeavor and report is the Department of the Army, New York District Corps of Engineers' letter to you dated September 22, 1970, from Robert Lindsay, Major, Corps of Engineers, Assistant Deputy for Civil Works, together with enclosures thereto.

The procedure followed in the preparation of the estimate was as follows:

1. Consultation with Major Lindsay and his staff at their offices in New York to establish the criteria on which the Corps of Engineers based their estimate to accomplish the suggested work relating to bridges in Table 1 and Table 2 of the September 22, 1970 letter to you.

2. Field reconnaissance and very general inspection of each structure to ascertain type, general condition, approach road characteristics, adjacent topography, number of spans, and existing deck dimensions.

3. Research on prevailing prices and previous experience in the Tri-State area (Southern Connecticut, Metropolitan New York City, and Northeastern New Jersey) related to raising fixed-span and movable bridges.

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As the result of the consultation with Major Lindsay and his staff, it was ascertained that the estimate for the proposed work was considered to be of a preliminary type (common practice at the stage of evolution of the project and degree of certainty prevailing for implementing any or all phases of the entire Flood Control Plan for the Passaic Valley). In addition to field reconnaissance made by the Corps of Engineers on the structures, it was ascertained that their estimate was based on a unit price of $10.00 per square foot to raise existing structures, with no distinction made between movable spans, fixed spans, or arches. Their estimate also included $50.00 per lineal foot per lane of roadway to accommodate approach roads to revised river-structure conditions. The Corps of Engineers' estimate did not include any cost for property damage or land acquisition as the result of modification of approach roads. It was their judgment no additional right-of-way would be required for approach roads. Furthermore, their estimate did not include the cost for temporary utility accommodations resulting from disruption of service during the raising or reconstruction of the existing bridges. No provision was included in the Corps' estimate for repairs to structures which our inspection reveals to be necessary.

The results of our reconnaissance inventory and classification of the bridges proposed to be modified are found in the Appendix of this report in tabular form. There is also included a photographic record of each existing structure, plus views of the approach roads and the environment adjacent to these roads approaching each structure.

Most of the bridges inspected exhibited structural deficiencies or physical deterioration, which in the judgment of our staff had a considerable influence on assigning the unit prices to the estimate of the cost to perform the work proposed by the Corps of Engineers. In addition to the nine bridges which the Corps of Engineers reported as being necessary to reconstruct, our team found seven structures which in our judgment were not feasible to raise and, therefore, would require replacement.

It was ascertained that there has been very little experience in this type of work in the Tri-State area on which to draw conclusions concerning raising either fixed or movable bridges. In the time available to us, we could find no experience on raising movable bridges in recent years and only one project where simple spans had been raised in conjunction with highway work.

Over the last few years the New Jersey Department of Transportation has found that its Engineer's Estimate when compared to Proposals submitted by contractors for complex highway, bridge, or retaining-wall construction were within 2% of the proposals submitted by contractors. Our experience on repair of existing bridges, either movable or fixed, both superstructure and substructure, has varied considerably. This experience results because bridge repair work is basically a custom operation, and conditions are not accurately known until the time the actual work commences and the various components of the structure are exposed or treatment commences.

The following schedule has been assigned in developing the estimate submitted herewith:

1. Raising a movable bridge five feet or less - $40.00 per square foot.
2. Raising a movable bridge above five feet - $50.00 per square foot.
3. Raising a simple structure span five feet or less - $20.00 per square foot.
4. Raising a simple structure span above five feet - $30.00 per square foot.
5. Constructing a new highway bridge over water - $50.00 per square foot.
6. Constructing a new railroad bridge over water - $100.00 per square foot.
7. Constructing a new movable railroad bridge over water - $150.00 per square foot.

Since it will be most economical and beneficial to all concerned, a lump sum of $4,500,000.00 is included in our estimate to cover necessary repairs to those structures which are designated to be raised. No such price was included in the Corps of Engineers' Estimate.

In view of the fact that the construction of Route 21 Freeway adjacent to the Passaic River has been an endeavor of the Department of Transportation for the last few years, very good engineering information was available for us to analyze the effect of the Flood Control proposals in relation to the existing State highway, local roads, and river crossings. This information existed for structures identified as 1 through 11 in the basic letter.

As the result of this knowledge, together with using acceptable standards for approach road grades to the revised river structures and maintaining standard legal vertical clearances, it was our judgment that $3,295,000.00 would be a necessary expenditure as the result of work on structures 1 through 11. Not having existing topographic data for structures 12 through 35, a lump sum figure for road work plus walls of $5,705,000.00 was assigned, making a total of $9,000,000.00 related to highway approach modifications required as a result of raising or reconstructing the bridges.

In the field reconnaissance it was found that two bridges exist on the State highway system which will require modification as the result of river-bridge raisings. These are designated in our inventory as 2A and 12A, and further account for 37 bridges in the inventory in lieu of 35 reported by the Corps of Engineers.

No determination was made as to the nature or ownership of utilities using subject bridges to facilitate crossing the Passaic River. It is the custom for utility companies to absorb the cost of any adjustments, modifications, reconstruction, and temporary work required when there is repair or reconstruction performed on existing bridges. An exception to this procedure is municipally-owned utilities. These are given preferential treatment by the cost of the work being absorbed by the agency performing the work. No specifics are provided in this estimate for utilities; however, the contingency figure does provide for whatever work may be necessary and which is paid for by the contracting agency.

It was the judgment of our inspection at each site that eighteen homes, sixty-eight commercial properties, and six churches would be affected as the result of raising or reconstructing the thirty-five existing bridges. Unit right-of-way costs assigned to this aspect were $20,000.00 per home unit, $80,000.00 for commercial units, and $200,000.00 for church units. $7,000,000.00 represent that portion of the work attributable to right-of-way. This figure as previously indicated was not included in any of the Corps of Engineers' estimate.

To cover the cost of an inspection-in-depth for twenty-one structures to be raised and paid for by others than the Corps of Engineers so that a construction contract can be prepared for the work, borings, contract preparation, designs for thirteen new bridges, supervision of the construction work, and quality control, it is estimated that approximately 15% of

the totals for (1) raising thirty-four bridges, (2) the road work associated therewith and, (3) the necessary repairs required on those structures which are raised, will amount to approximately $4,500,000.00.

Of the thirty-seven bridges needing attention and reported in our inventory, three are railroad bridges. The Corps of Engineers is obligated to assume any costs associated with work thereon when related to flood control. Hence, work on these structures has been estimated but is not included in our Estimate Summary.

Contingencies in our estimate provide for costs of right-of-way acquisition, which include such items as appraisal, negotiation and condemnation, moving expenses, allied eligible costs related to relocation, and other incidentals -- all of which are currently recognized by the State of New Jersey and the Federal Government to be attributable and required costs for displacement in conjunction with highway, public works, or urban renewal programs. Part of the contingency sum covers escalation in the estimate to provide for price increases which may occur until contracts can be awarded. This is considered to be no more than three years. Further deferment in work will revise this estimate.

In conclusion, $47,000,000.00 is the estimated cost of improving the flow of flood waters by raising or reconstructing numerous bridges on the Passaic River. A summary of the estimate is included herewith.

As you are aware, the work proposed by this estimate is a portion of a larger program proposed as Plan "C" of the report, "Passaic River Basin Water Resources Development". This total program has been given publicity by the former Department of Conservation and Economic Development, and the Corps of Engineers. It is the writer's opinion that only the raising or reconstruction of subject bridges will produce hardly any beneficial effects on flooding in the basin when rain-storm conditions producing recent floods are duplicated unless there is an immediate follow-up and achievement of the other phases of the entire Plan "C".

It is hoped that this information will be of assistance to

you in reaching a conclusion concerning this portion of the Flood Control Program.

Very truly yours,

J. R. Schuyler

J. R. Schuyler, P.E.
State Highway Engineer

Enc. 6:

1. Estimate Summary
2. Bridge Inventory Analysis
3. Bridge Inventory Summary
4. Road Inventory Analysis
5. Property Analysis
6. Photographic Record of Bridges and Approaches

ESTIMATE SUMMARY

1.	Raise or Replace 32 Bridges (Raise 19, Replace 13; Price includes demolition where existing structures are replaced; Sum does not include costs figures in N.J.D.O.T. analysis for railroad bridges, which is paid by Corps of Engineers.)	$14,000,000.00
2.	Repairs to 17 Remaining Structures	4,500,000.00 *
3.	Road Work	9,000,000.00
4.	Engineering (Inspections-in-depth on each structure, borings, designs, contract preparation, construction supervision. Approximately 15% of Items 1, 2, and 3.)	4,000,000.00
5.	Right-Of-Way	7,000,000.00 *
6.	Contingencies and Administrative Costs (Utility costs, escalation for three years, all cost of right-of-way acquisition and relocation payments. Approximately 20% of Items 1 through 5.)	8,500,000.00
	TOTAL	$47,000,000.00

(*) Not included in Corps of Engineers' Estimate

PASSAIC RIVER BRIDGE STUDY

REF. NO.	NAME OF STRUCTURE	DESCRIPTION OF EXISTING BRIDGE	DECK AREA ϕ	PROPOSED WORK *	REQUIRED STRUCTURAL MODIFICATION & COST RAISE		NEW	REMARKS (UPSTREAM REFERENCED NORTH)
1	Rutgers St.	Hwy - Bascule thru truss and 3 thru trusses	19,900	Raise 1.6'	$ 582,000			West Side - Rt. 21 Viaduct East Fascia 48'± from West Abut.
2	Avondale (Park Ave.)	Hwy - Swing thru truss and 2 thru trusses	14,500	Raise 4.4'	$ 514,000			West Side - Rt. 21 Viaduct East Fascia 51'± from West Abut.
2A	Rt.21 Freeway OP @ Park Ave.	Hwy - Steel Stringers	7,600	Raise**	$ 152,000			**Raise As Required By Avondale Ave.
3	Union Ave.	Hwy - Swing thru truss and 2 deck trusses	8,830	Raise 2.5'	$ 295,000			
4	Erie RR	Not in existence		Replace			$ 378,000	West Side - Possible Rt. 21 Viaduct Approach Problem.
5	Gregory Ave.	Hwy - Swing thru truss	12,200	Raise 6.1'	$ 610,000			East & West Sides - Possible Roadway Approach Problems.
6	Second (Market St.)	Hwy - Double bascule deck girder and 2 concrete encased deck girders	16,300	Raise 10.3'	$ 597,000			East & West Sides - Possible Building Approach Problems.

PASSAIC RIVER BRIDGE STUDY

REF. NO.	NAME OF STRUCTURE	DESCRIPTION OF EXISTING BRIDGE	DECK AREA ϕ	PROPOSED WORK *	REQUIRED STRUCTURAL MODIFICATION & COST RAISE		NEW	REMARKS (UPSTREAM REFERENCED NORTH)
7	Eighth St.	Hwy - Bascule thru truss and 2 through trusses	15,400	Raise 9.5'	$ 554,000			East Side - Possible Roadway Approach Problem
8	Wall St.	Hwy - Thru steel girders, 3 spans	10,200	Raise 7.8'	$ 306,000			East and West Sides - Possible Building and Roadway Approach Problems.
9	Erie RR	RR - One track and walkway, 23 timber trestle bents	4,130	Replace & Raise 5.0'			$ 475,000	East and West Sides - Possible Building and RR Approach Problems.
10	Monroe St.	Hwy - Deck concrete arch, 3 spans	13,300	Replace & Raise 3.4'			$ 765,000	East and West Sides - Possible Building and Roadway Approach Problems.
11	Ackerman Ave.	Hwy - Deck concrete arch, 7 spans	14,500	Raise 1.7'			$972,000	East and West Sides- Possible Building and Roadway Approach Problems. New structure considered because of difficulty of raising concrete arch.
12	Market St.	Hwy - Concrete encased deck girders, 6 spans	17,100	Raise 1.4'	$ 342,000			West Side - Rt. I-80 Ramp "A" to Rt. 20 Fascia 17'± from West Abut.
12A	Rt. I-80 Ramp "A" Over Market St. To Rt. 20.	HWY - Steel Stringer	55,600	Raise**	$ 1,100,000			** Raise As Required By Market St.

PASSAIC RIVER BRIDGE STUDY

REF. NO.	NAME OF STRUCTURE	DESCRIPTION OF EXISTING BRIDGE	DECK AREA ☐	PROPOSED WORK *	REQUIRED STRUCTURAL MODIFICATION & COST RAISE		NEW	REMARKS (UPSTREAM REFERENCED NORTH)
13	Maple Ave. (Wagaraw Br.)	Hwy - Deck concrete arch, 3 spans	13,000	Raise 1.0'			$ 748,000	New structure Considered because of difficulty of raising concrete arch.
14	E. 19th St. (Moffet St.)	Hwy - Concrete encased deck girders, 6 spans	18,300	Raise 3.9'	$ 366,000			East and West Sides - Possible Roadway Approach Problems.
15	Suspension Foot Bridge (Weidman Dye Works)			Remove				
16	Hillman St.	Hwy - Through steel arch truss	9,400	Raise 4.5'	$ 188,000			East and West Sides - Possible Roadway and Building Approach Problems.
17	Straight St.	Hwy - Through steel truss	12,500	Raise 1.2'	$ 250,000			East and West Sides - Possible Roadway and Building Approach Problems.
18	Arch St.	Hwy - Through steel arch truss	8,900	Raise 5.9'	$ 267,000			East and West Sides - Possible Roadway and Building Approach Problems.

PASSAIC RIVER BRIDGE STUDY

REF. NO.	NAME OF STRUCTURE	DESCRIPTION OF EXISTING BRIDGE	DECK AREA ☐	PROPOSED WORK *	REQUIRED STRUCTURAL MODIFICATION & COST RAISE		NEW	REMARKS (UPSTREAM REFERENCED NORTH)
19	Main St.	Hwy - 3 hinged, deck steel arch, 3 spans	11,200	Replace & Raise 5.7'			$ 644,000	East and West Sides - Possible Building and Roadway Approach Problems.
20	Mulberry St. (Motor Car Entrance)	Hwy - steel thru truss	2,880	Raise 4.1'	$ 58,000			West Side - Possible Roadway Approach Problem.
21	Rockland St.	Ped - continuous steel truss, 3 spans	2,320	Replace Piers & Raise 2.7'	$ 80,000			West Side - Possible Building Approach Problem.
22	Hillery St.	Hwy - thru steel truss, 4 spans	11,900	Raise 3.0'			$ 828,000	East Side - Possible Building Approach Problem. New structure considered.
23	Lackawanna Ave.	Hwy - thru steel truss, 3 spans	6,360	Raise 1.1'	$127,000			West Side - Possible Building Approach Problem.
24	Midland Ave. over Saddle River	Hwy - steel stringers	2,180	Replace & Raise 8.4'			$ 140,000	East Side - Possible Building Approach Problem.

PASSAIC RIVER BRIDGE STUDY

REF. NO.	NAME OF STRUCTURE	DESCRIPTION OF EXISTING BRIDGE	DECK AREA ☐	PROPOSED WORK *	REQUIRED STRUCTURAL MODIFICATION & COST RAISE		NEW	REMARKS (UPSTREAM REFERENCED NORTH)
25	River Drive over Fleischer's Brook	Hwy - stone arch, 1 span	1,070	Replace & Raise 8.6'			$123,000	East and West Sides - Possible Building and Roadway Approach Problems.
26	Lizette St. over Fleischer's Brook	Hwy - concrete slab, 1 span	680	Raise 3.6'			$ 39,000	West Side - Possible Building Approach Problem. New structure considered.
27	Westside Park Rd. over Molly Ann's Brook	Hwy - steel stringers and floorbeams, 1 span	1,660	Raise 2.8'	$ 33,000			
28	Totowa Ave. over Molly Ann's Brook	Hwy - concrete beam, 1 span	2,630	Raise 3.0'	$ 53,000			East and West Sides - Possible Building Approach Problems.
29	Little Falls Rd. over Deepavaal Brook	Hwy - concrete beam, 1 span	1,600	Replace & Raise 1'			$ 92,000	
30		Not listed						

PASSAIC RIVER BRIDGE STUDY

REF. NO.	NAME OF STRUCTURE	DESCRIPTION OF EXISTING BRIDGE	DECK AREA ☐	PROPOSED WORK *	REQUIRED STRUCTURAL MODIFICATION & COST RAISE		NEW	REMARKS (UPSTREAM REFERENCED NORTH)
31	Schuyler Ave. (Lakeside Ave.) over Ramapo River.	Hwy - Steel stringers, 3 spans	7,380	Raise 4.1'			$ 863,000	New Structure Considered.
32	Ramapo Ave. (Doty Rd.) over Ramapo River.	Hwy - Steel thru truss, 1 span, 1 lane	1,270	Replace			$ 705,000	East and West Side - Possible Building Approach Problems.
33	NYS & W RR over Ramapo River	RR - 1 track, steel deck truss, 3 spans	3,070	Replace piers & abutments			$ 352,000	New Structure Considered.
34	W. Oakland Ave. over Ramapo River	Hwy - Steel thru truss, 3 spans	3,540	Replace			$ 705,000	East and West Sides - Possible Building Approach Problems.
35	Lenape Ave. over Ramapo River	Hwy - Steel stringers, 4 spans	4,130	Replace			$ 705,000	East and West Sides - Possible Building Approach Problems.
					$ 6,474,000		$ 8,534,000	TOTALS
						$ 15,008,000		GRAND TOTAL

* WORK AS PROPOSED BY THE DEPT. OF THE ARMY

BRIDGE INVENTORY SUMMARY

	No. in Corps of Engrs. Estimate	No. By N.J.D.O.T. Field Reconnaissance Analysis	No. Included N.J.D.O.T. Estimate
RIVER BRIDGES			
A. Raised	24	17	17
B. Replaced	6	13	13
C. Removed	1	1	0
D. Not Reported	0	1	0
RAILROAD BRIDGES			
A. Raised	1	0	0
B. Replaced	2	2	0
C. Not In Existence	0	1	0
BRIDGES ON LOCAL ROAD NETWORK AFFECTED AS RESULT OF RIVER BRIDGE MODIFICATIONS	0	2	2
TOTAL	34	37	32

PASSAIC RIVER BRIDGE STUDY

Ref. No.	Name of Structure	Proposed Work	Road Work		Walls	Total
			Route 21	Local Street	Rt. 21 & Local	
1	Rutgers Street	Raise 1.6'	------	$ 75,000	------	$ 75,000
2	Park Avenue	Raise 4.4'	$400,000	$140,000	$ 65,000	$605,000
3	Union Avenue	Raise 2.5'	------	$105,000	------	$105,000
4	Erie R.R.	Replace Truss	------	------	------	------
5	Gregory Avenue	Raise 6.1'	------	$395,000	$ 40,000	$435,000
6	Second Street	Raise 10.3'	------	$530,000	------	$530,000
7	Eighth Street	Raise 9.5'	------	$430,000	$ 90,000	$520,000
8	Wall Street	Raise 7.8'	------	$515,000	$120,000	$635,000
9	Erie R.R.	Raise 5.0'	(INCLUDED UNDER MONROE ST.)			
10	Monroe Street	Raise 3.4'	------	$240,000	$105,000	$345,000
11	Ackerman Avenue	Raise 1.7'	------	$ 45,000	------	$ 45,000
SUB - TOTAL			$400,000	$2,475,000	$420,000	$3,295,000

Ref. No.	Name of Structure	Proposed Work	Road Work		Walls	Total
			Route 21	Local Street	Rt. 21 & Local	
		PRORATED				
12	Market Street	Raise 1.4'				
13	Maple Avenue	Raise 1.0'				
14	E. 19th Street	Raise 3.9'				
15	Suspension Foot Bridge	Remove	(NOT APPLICABLE)			
16	Hillman Street	Raise 4.5'				
17	Straight Street	Raise 1.2'				
18	Arch Street	Raise 5.9'				
19	Main Street	Replace & Raise 5.7'				
20	Mulberry Street	Raise 4.1'				
21	Rockland Street	Replace Piers & Raise 2.7'				
22	Hillery Street	Raise 3.0'				
23	Lackawana Avenue	Raise 1.1'				

Ref. No.	Name of Structure	Proposed Work	Road Work		Walls	Total
			Route 21	Local Street	Rt. 21 & Local	
24	Midland Avenue	Replace & Raise 8.4'				
25	River Drive	Replace & Raise 8.6'				
26	Lizette Street	Raise 3.6'				
27	Westside Park Road	Raise 2.8'				
28	Totowa Avenue	Raise 3.0'				
29	Little Falls Road	Replace & Raise 1.0'				
30	N O T L I S T E D					
31	Schuyler Avenue	Raise 4.1'				
32	Ramapo Avenue	Replace				
33	NYS & WRR	Replace Piers & Abutments				

Ref. No.	Name of Structure	Proposed Work	Road Work		Walls	Total
			Route 21	Local Street	Rt. 21 & Local	
34	W. Oakland Avenue	Replace				
35	Lenape Avenue	Replace				
S U B - T O T A L						$5,705,000
T O T A L						$9,000,000

E S T I M A T E O F A F F E C T E D P R O P E R T I E S

Type Property	Number	Unit Cost	Total
Homes	18	$20,000	$360,000
Commercial	68	$80,000	$5,440,000
Church	6	$200,000	$1,200,000
S U B - T O T A L			$7,000,000

Reference No. 1

Rutgers St.
South Face - Looking North

Reference No. 1

Rutgers St.
Looking E. toward Bridge

Reference No. 1

Rutgers St.
From Bridge looking West

Reference No. 1

Rutgers St.
Looking West toward Bridge

Reference No. 1

Rutgers St.
From Bridge looking East

Reference No. 1

Rutgers St.
North Face - Looking South

Reference No. 2

Avondale (Park Ave.)
Looking West toward Bridge

Reference No. 2

Avondale (Park Ave.)
From Bridge Looking East

Reference No. 2

Avondale (Park Ave.)
From Bridge looking West

Reference No. 2

Avondale (Park Ave.)
Looking East toward Bridge

Reference No. 2

Avondale (Park Ave.)
South Face - Looking North

Reference No. 2

Avondale (Park Ave.)
North Face - Looking South

Reference No. 3

Union Ave.
Looking West toward Bridge

Reference No. 3

Union Ave.
From Bridge looking East

Reference No. 3

Union Ave.
From Bridge looking West

Reference No. 3

Union Ave.
Looking East toward Bridge

Reference No. 3

Union Ave.
South Face - Looking North

Reference No. 3

Union Ave.
North Face - Looking South

Reference No. 4

Erie R. R.
Looking N.E. over river from
East Bank

Reference No. 4

Erie R. R.
Looking S.E. from river bank

Reference No. 4

Erie R. R.
Looking N.E. from end of Tracks

Reference No. 4

Erie R. R.
Looking S.E. from end of Tracks

Reference No. 4

Erie R. R.
Looking S. E. from West Bank
across river

Reference No.

Erie R. R.
Looking N.W. up old R.R. Bed

Reference No. 5

Gregory Ave.
Looking East toward Bridge

Reference No. 5

Gregory Ave.
Looking West from Bridge

Reference No. 5

Gregory Ave.
Looking East from Bridge

Reference No. 5

Gregory Ave.
Looking West toward Bridge

Reference No. 5

Gregory Ave.
North Face - Looking South

Reference No. 5

Gregory Ave.
South Face - Looking North

Reference No. 6

Second St. (Market St.)
Looking South to Bridge

Reference No. 6

Second St. (Market St.)
Looking North from Bridge

Reference No.

Second St. (Market St.)
Looking South from Bridge

Reference No. 6

Second St. (Market St.)
Looking North to Bridge

Reference No. 6

Second St. (Market St.)
West Face - Looking East

Reference No. 6

Second St. (Market St.)
East Face - Looking West

Reference No. 7

Eighth St.
Looking South toward Bridge

Reference No. 7

Eighth St.
Looking North from Bridge

Reference No. 7

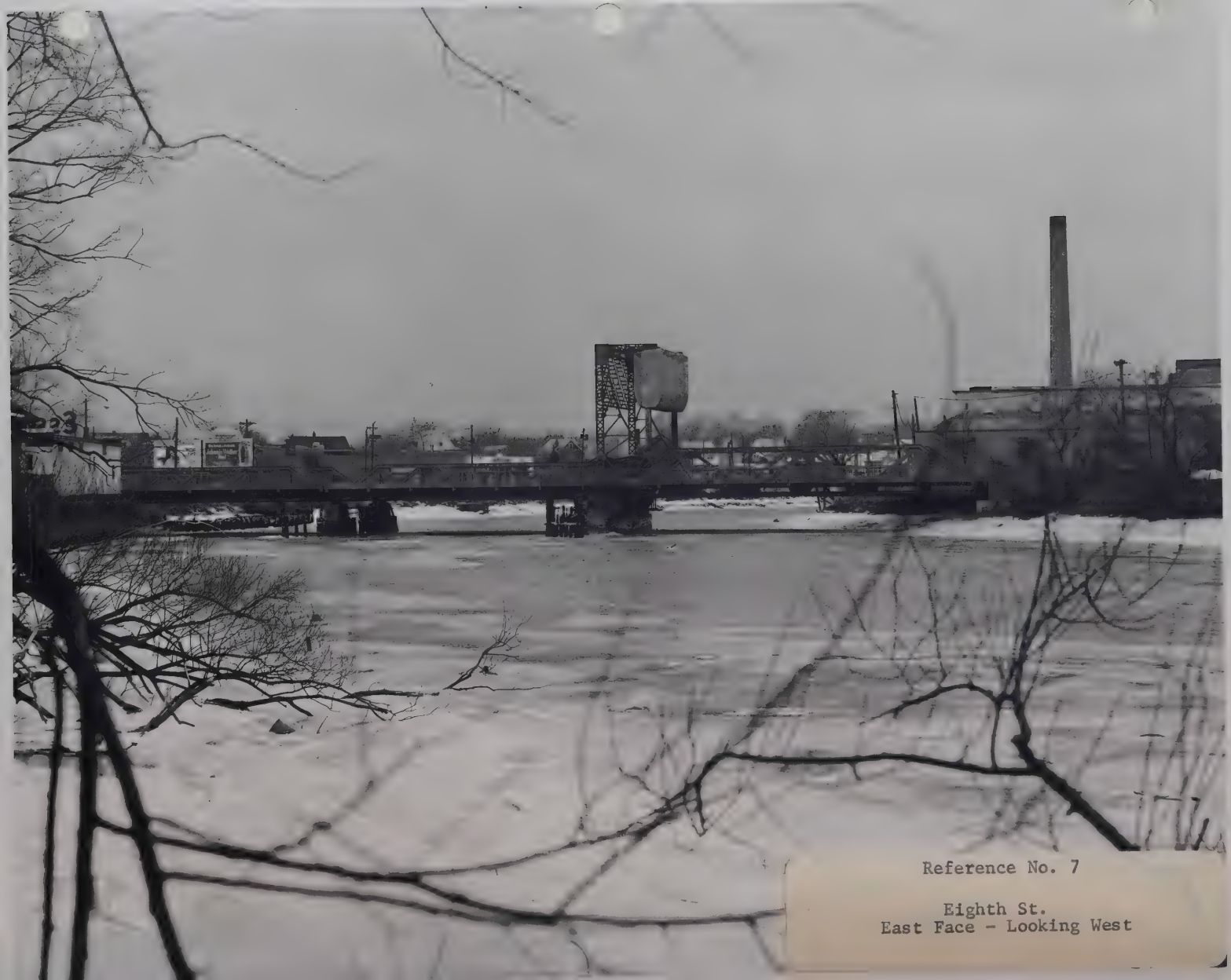
Eighth St.
Looking South from Bridge

Reference No. 7

Eighth St.
Looking North toward Bridge

Reference No. 7

Eighth St.
West Face - Looking East



Reference No. 7

Eighth St.
East Face - Looking West

Reference No. 8

Wall St.
Looking S.W. toward Bridge

Reference No. 8

Wall St.
Looking N.E. from Bridge

Reference No. 8

Wall St.
Looking S.W. from Bridge

Reference No. 8

Wall St.
Looking N.E. toward Bridge

Reference No. 8

Wall St.
North West Face looking S.E.

Reference No. 8

Wall St.
South East Face looking N.W.

Reference No. 9

Erie R. R.
South Face - Looking North

Reference No. 9

Erie R. R.
North Face - Looking S.W.

Reference No. 9

Erie R. R.
Looking West to Bridge

Reference No. 9

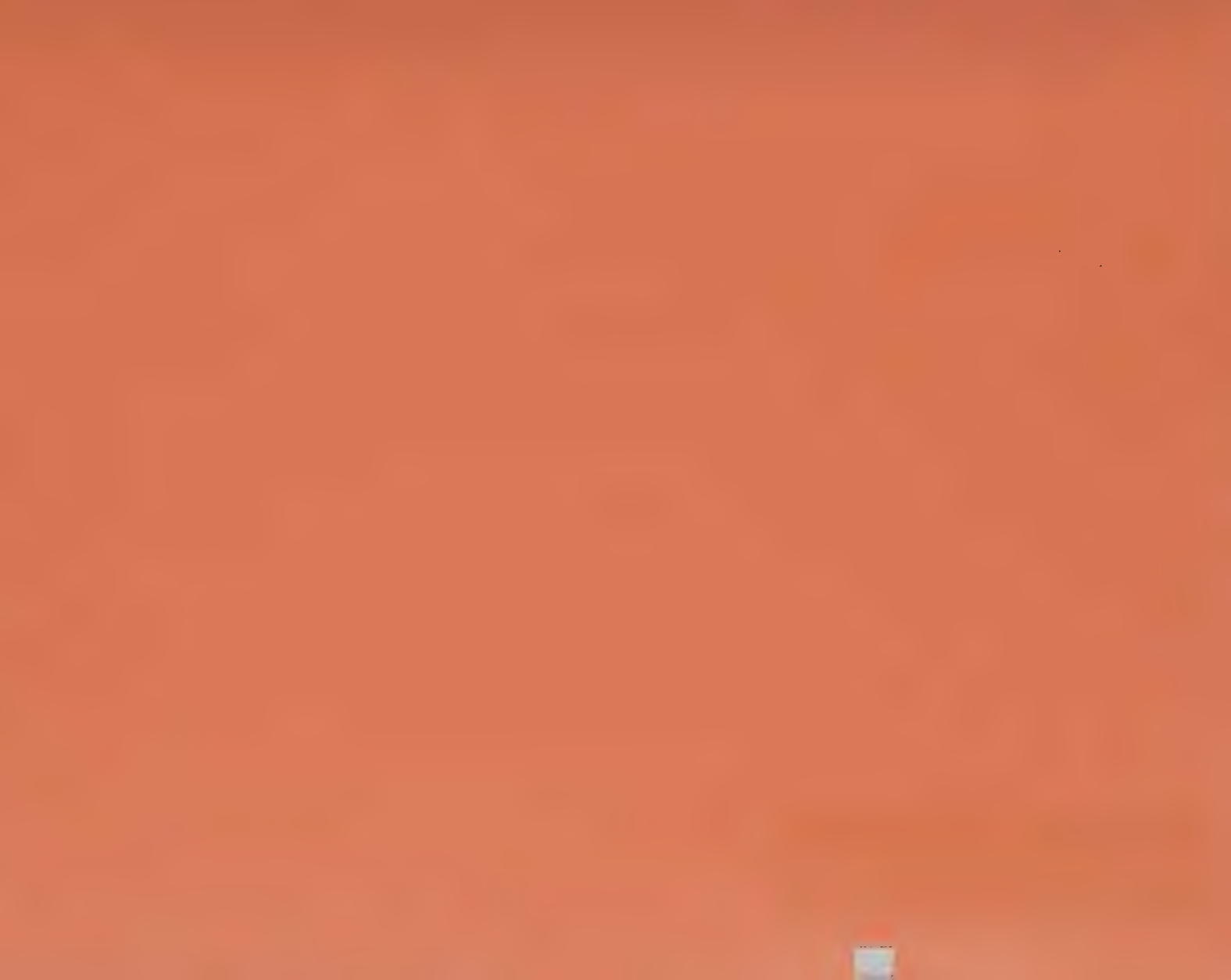
Erie R. R.
Looking East from Bridge

Reference No. 9

Erie R. R.
Looking West From Bridge

Reference No. 9

Erie R. R.
Looking East toward Bridge



Reference No. 10

Monroe St.
Looking East toward Bridge

Reference No. 10

Monroe St.
North Face - Looking S.E.

Reference No. 10

Monroe St.
Looking West from Bridge

Reference No. 10

Monroe St.
Looking East from Bridge

Reference No. 10

Monroe St.
Looking West toward Bridge

Reference No. 10

Monroe St.
South Face - Looking N.W.

Reference No. 11

Ackerman Ave.
Looking N.E. toward Bridge

Reference No. 11

Ackerman Ave.
Looking S.W. from Bridge

Reference No. 11

Ackerman Ave.
Looking N.E. from Bridge

Reference No. 11

Ackerman Ave.
Looking S.W. toward Bridge

Reference No. 11

Ackerman Ave.
S.E. Face - Looking N.W.

Reference No. 11

Ackerman Ave.
N.W. Face - Looking S.E.

Reference No. 12

Market St.
Looking East from Bridge

Reference No. 12

Market St.
Looking West toward Bridge

Reference No. 12

Market St.
Looking West from Bridge

Reference No. 12

Market St.
South Face - Looking N.E.

Reference No. 12

Market St.
Looking East toward Bridge

Reference No. 12

Market St.
North Face - Looking S.E.

Reference No. 13

Maple Ave. (Wagaraw Br.)
Looking S. East toward Bridge

Reference No. 13

Maple Ave. (Wagaraw Br.)
Looking N. West from Bridge

Reference No. 13

Maple Ave. (Wagaraw Br.)
Looking North toward Bridge

Reference No. 13

Maple Ave. (Wagaraw Br.)
South West Face - Looking N.E.

Reference No. 13

Maple Ave. (Wagaraw Br.)
Looking S.E. from Bridge

Reference No. 13

Maple Ave. (Wagaraw Br.)
North East Face - Looking S.W.

Reference No. 14

E. 19th St. (Moffet St.)
Looking East toward Bridge

Reference No. 14

E. 19th St. (Moffet St.)
Looking West from Bridge

Reference No. 14

E. 19th St. (Moffet St.)
South Face - Looking N. E.

Reference No. 14

E. 19th St. (Moffet St.)
North Face - Looking S.W.

Reference No. 14

E. 19th St. (Moffet St.)
Looking N.E. from Bridge

Reference No. 14

E. 19th St. (Moffet St.)
Looking N.W. toward Bridge

THE SUSPENSION FOOT BRIDGE

ORIGINALLY LOCATED AT THIS SITE

HAS NOW BEEN REMOVED.

Reference No. 16

Hillman St.
Looking N.W. toward Bridge

Reference No. 16

Hillman St.
Looking S.E. from Bridge

Reference No. 16

Hillman St.
S.W. Face - Looking N.E.

Reference No. 16

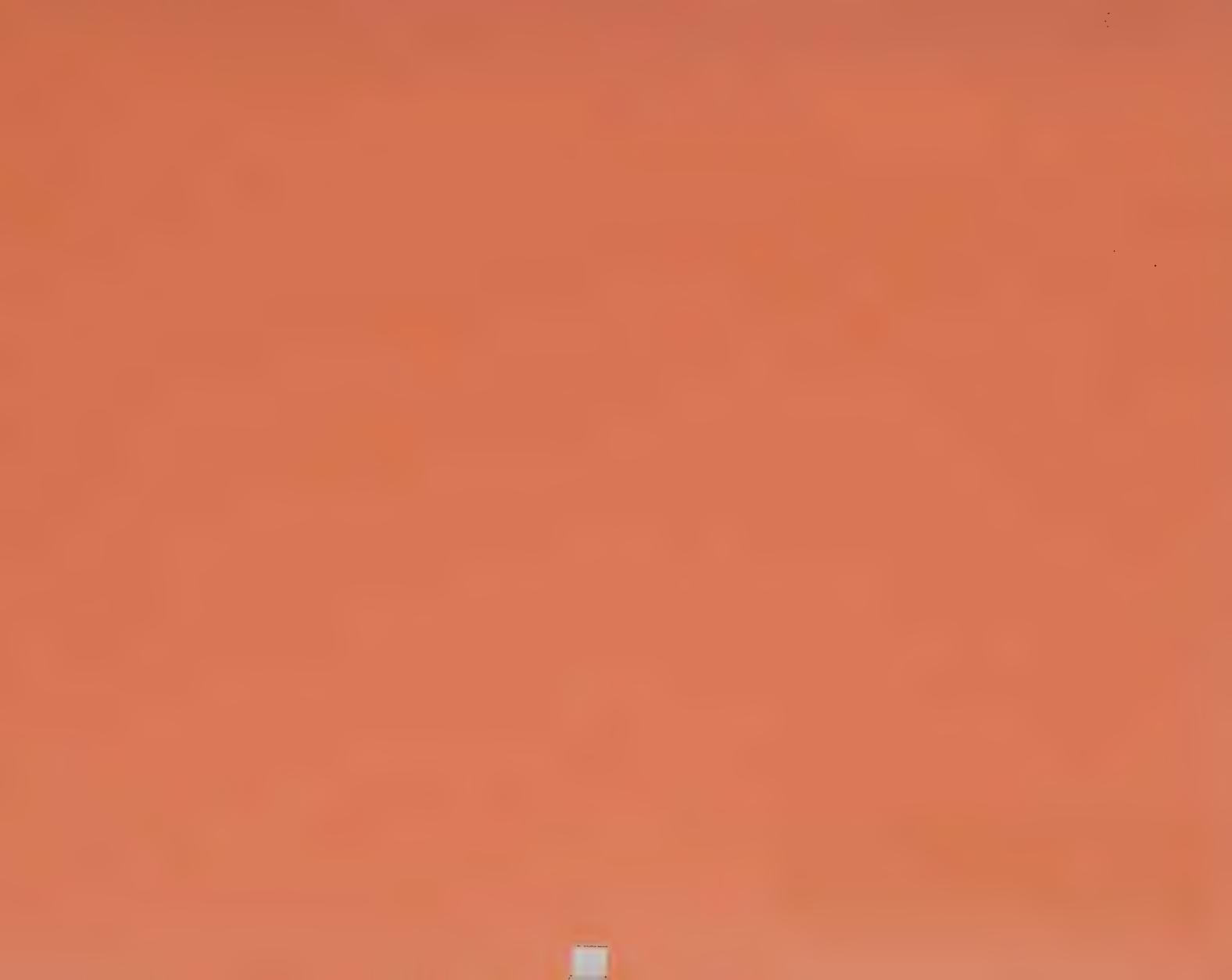
Hillman St.
N.E. Face - Looking S.W.

Reference No. 16

Hillman St.
Looking N.W. from Bridge

Reference No. 16

Hillman St.
Looking South toward Bridge



Reference No. 17

Straight St.
N.W. Face - Looking S.E.

Reference No. 17

Straight St.
Looking S.W. from Bridge

Reference No. 17

Straight St.
Looking N. toward Bridge

Reference No. 17

Straight St.
Looking S.W. toward Bridge

Reference No. 17

Straight St.
S.E. Face - Looking N.W.

Reference No. 17

Straight St.
Looking N.E. from Bridge

Reference No. 18

Arch St.
Looking West toward Bridge

Reference No. 18

Arch St.
Looking N.E. from Bridge

Reference No. 18

Arch St.
Looking S.W. from Bridge

Reference No. 18

Arch St.
Looking N.E. toward Bridge

Reference No. 18

Arch St.
N.W. Face - Looking S.E.

Reference No. 18

Arch St.
S.E. Face - Looking N.W.

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